

# Hawaii's Software Development Industry Skill Panels



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ADDENDUM TO THE COMPREHENSIVE  
STATE PLAN FOR WORKFORCE  
DEVELOPMENT 2009-2014



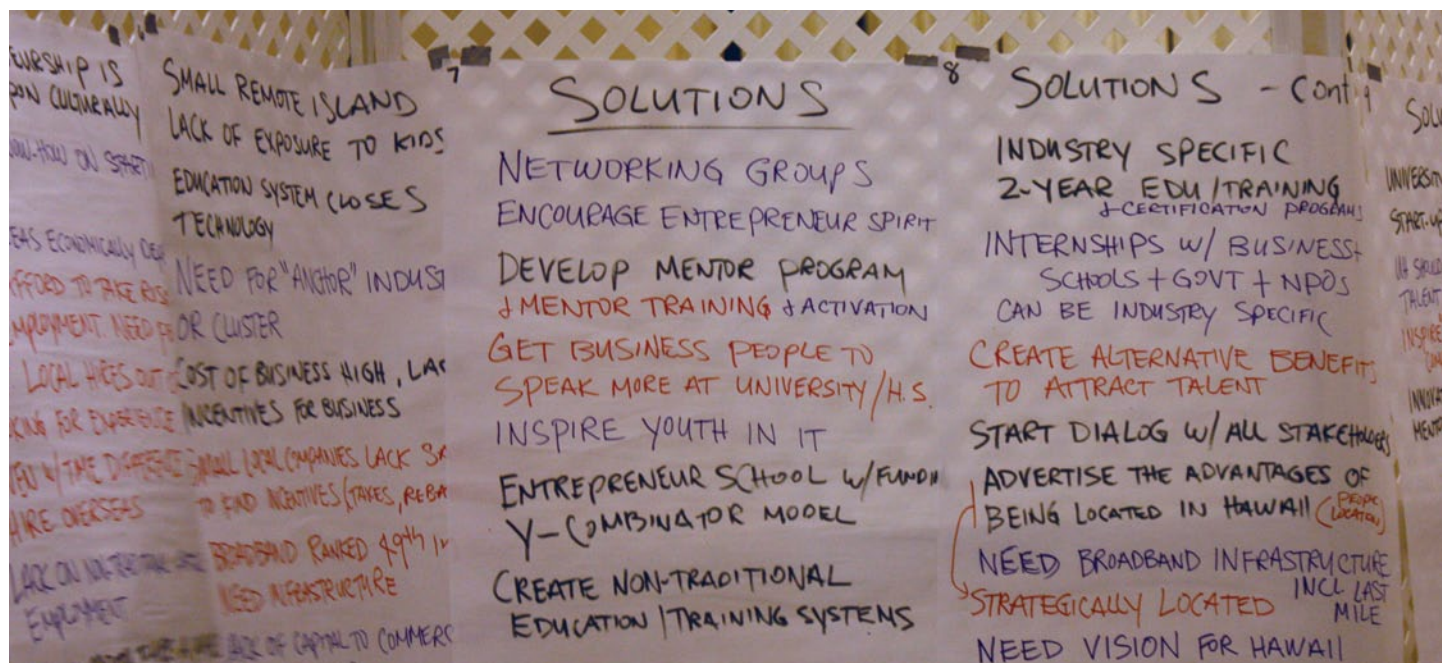
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Workforce Development Council | 830 Punchbowl Street, Room 417 | Honolulu, Hawaii 96813

NEIL ABERCROMBIE, GOVERNOR | STATE OF HAWAII

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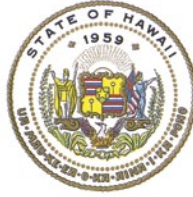
## PANEL FACILITATORS

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## SPECIAL MAHALO TO

**Henk Rogers** for his vision and commitment to the Hawaii community  
**Kristina Hudson** for an objective and national perspective on expanding an industry around key workforce development issues  
**Glen Tanigawa** and **David Lassner**

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October 14, 2011

The Honorable Neil Abercrombie  
Governor, State of Hawaii  
Executive Chambers, State Capitol  
Honolulu Hawaii 96813

Dear Governor Abercrombie:

I am pleased to submit the Hawaii Software Development Industry Skill Panel report. Sponsored by the Department of Labor and Industrial Relations (DLIR), Workforce Development Council (WDC), the High Technology Development Corporation, the Career and Technical Education Center at the University of Hawaii and the University of Hawaii Community College System, these initial findings and recommendations represent the work of over 100 stakeholders statewide from our software development community. The early successes of these efforts are the result of broad-based participation by both the private and public sectors.

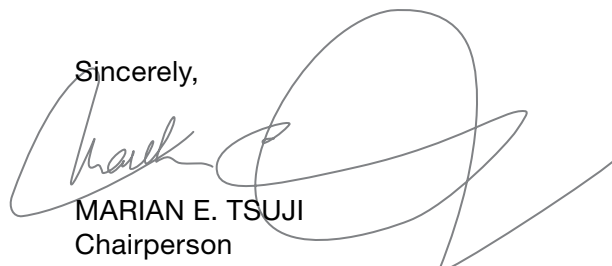
In keeping with the "New Day" objectives regarding workforce development and innovation, this plan comes from a simple premise: that innovation is the key to increased economic opportunities for Hawaii and its residents. Software development is a key ingredient in promoting an innovation culture while developing a home-grown industry that enriches the economic livelihood of residents. An advancing software development industry will help to keep our young professionals in the islands.

Similar to the healthcare community after their Healthcare Industry Skill Panels, the software development community continues to meet and address the issues identified in this plan. This has already produced positive outcomes which are identified in the "post-meeting activities" section of this report.

Equally important has been the proactive steps your administration has already taken to meet the needs of this industry. Specifically, it was generally agreed by all participants that the industry and related stakeholders need a common vision, in which government should take a leadership role. It was felt that the primary goal for government should be to strongly advocate for a statewide Broadband initiative. The enactment of Act 151 to advance the wider establishment of Broadband capabilities provides that leadership and common vision.

We look forward to your review and feedback.

Sincerely,



MARIAN E. TSUJI  
Chairperson



Aloha Hawaii Software Industry Stakeholders:

As a resident of Hawaii, and a University of Hawaii alumnus, I am honored to be a part of a small but growing community of software industry leaders working to create a viable, vibrant and sustainable software development industry in Hawaii.

I have always seen Hawaii as a place where a computer science industry, including software developers, could grow deep roots and become a driver of the 21<sup>st</sup> century economy of the State. The potential of the software industry to grow in Hawaii is more achievable now than at any other time. After all, what other industry does not require use of natural resources, has the ability to quickly develop that would allow for new financial capital to come into the state, and is a "clean industry" that protects our fragile ecosystem?

The question is--how does Hawaii tap that potential? In my opinion developing the needed infrastructure and securing funding for our venture aren't the only challenges. Our biggest barrier is the lack of local talent pool. Currently, many local skilled professionals with academic degrees in software development find more opportunities on the mainland. This continuous brain drain of skilled talent creates a barrier for any computer science company that wants to develop and grow its business.

New and creative approaches are needed to identify and close the gaps in workforce development while also improve the business climate for the software development and related industries. Only through collaboration between industry, policymakers and educators can we hope for this industry to grow. I hope this Skill Panel can start Hawaii on the path to make this industry one of the stars of the state's economy in years to come.

Aloha,

A handwritten signature in blue ink, appearing to read "Henk B. Rogers", is positioned above the printed name.

Henk B. Rogers  
Chairman & CEO  
BluePlanet Software

Industry Skill Panels are private/public partnerships that collaborate to address competitiveness issues by focusing on workforce development. The state Workforce Development Council (“WDC”) implemented these sector-based approaches in order to better identify strategic planning issues and make recommendations regarding Hawaii’s workforce within specific industries. Participation from employers, educational institutions, economic development organizations, labor organizations, and others ensure that a variety of stakeholder perspectives are represented. In Hawaii, the WDC’s inaugural Skill Panel focused on the Healthcare industry. Designed to be action-oriented, the Healthcare Skill Panels had a number of successes, including:

- Conducting a comprehensive hospital survey identifying high-need specialty nursing occupations based on current vacancies and projected retirement rates;
- Gathering employers and educators to leverage resources by creating a uniform statewide curriculum and pilot project to train Critical Care nurses;
- Forming a new Workforce Readiness Panel spearheaded by community colleges to develop a workforce readiness curriculum leading to a certificate recognized by employers statewide; and
- Identifying industry issues leading to the creation of a Healthcare Workforce Improvement Plan with potential implementation grant funds available in 2012.

Nurturing Software Development in Hawaii benefits the larger economy, as the industry does not impact the environment, divert tourism resources, or require large investments in warehousing or manufacturing facilities. The industry requires relatively small amounts of capital and pays higher-than-average salaries. However, software companies struggling to develop adequate talent pipelines must hire mainland workers, even if they prefer to hire locally.

The High Technology Development Corporation (“HTDC”) and the WDC partnered to organize industry Skill Panels for the Software Development industry. Along with an Executive Committee comprised of industry leaders, four Panels were organized: “New Software Developer,” “Expe-

rienced Software Developer,” “Small Company/Startup,” and “Large Company” Skill Panels. For these first Panels, the decision was made to examine companies that *create* and *sell* software, rather than include organizations (such as universities and financial institutions) that are heavy *users* of software.

The goals of the Software Development Skill Panels are to

- Promote the state of Hawaii as a center for software development;
- Educate government and community leaders about the importance of the Software industry to the local economy and the need for a quality workforce base;
- Work with educational institutions to ensure the Hawaii-based Software workforce is being prepared for the “jobs of tomorrow”; and
- Offer solutions and assist with the implementation of initiatives that grow Hawaii’s software industry.

Panel members were selected to represent various sectors of the industry, including large and small employers, the education system, and the public workforce system.

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## COMMON THREADS IN INDUSTRY SKILL PANEL DISCUSSIONS

Panel members were asked to develop a list of issues and desired outcomes for their particular focus. As with the healthcare Skill Panels, there were a number of common issues and outcomes across the groups. In education, career pathways are not well-articulated, which affects students’ career choices. This needs to be addressed in K-12 education, colleges and universities, and beyond:

- **K-12 LEVEL:** Competitions similar to those for robotics would increase interest in software development. More industry professionals should visit schools in order to create interest.
- **COLLEGE AND UNIVERSITY LEVEL:** Degree programs need to be constantly evaluated and improved, as businesses often require skills that are

not taught in schools. Also, as with the healthcare Skill Panels, “workforce readiness” is a major issue with employers. To address this issue, universities and companies should create more internships and work-study positions that provide hands-on experience. Industry and private partnerships should also be employed to update educational curricula to meet the needs of industry.

Another important issue at the college and university level is that there are too few graduates to meet the needs of local industry. Explanations for this may include:

- a) Many of the top quality graduates leave Hawaii for higher-paying jobs on the mainland or globally.
  - b) High attrition rates in the degree programs—it should be investigated whether attrition is indeed too high, what the causes are, and how it can be corrected.
  - c) Access to certain degree programs and courses for students throughout the state could be improved. Perhaps new educational approaches are needed—for example, Panelists suggested creating a community college Computer Science program using video with lab assistants in the classroom.
- **POST-GRADUATE LEVEL:** Government and educational institutions can and should play an important role. Government can create a more competitive business environment that could help to attract

potential employees from outside the state. This would include graduates of Hawaii universities and other workers with Hawaii ties. The “Kama’aina Come Home” program should be revived and updated. In addition, professionals need more access to continuing education to update their certifications and learn new tools and skills.

Government should play a critical role in nurturing the software industry by:

- a) Providing a competitive business environment that will attract and retain Software Development businesses in the state, and
- b) Supporting and upgrading the infrastructure necessary for successful Software Development businesses—in particular, access to broadband communication.

The ratio of declared Software Development majors to actual graduates is about 10:1. The ratio itself may or may not be a problem, but the community is not graduating enough students trained in Software Development skills to satisfy even the current growth of the Software industry. Another topic worth exploring has to do with Software Development-related courses that are taught in various disciplines. Because some level of Software Development is taught in so many different branches of higher education (from a business school to a Physics class), it is hard to determine if there is (or should be) any consistency across the curricula.



Industry Skill Panels are private/public partnerships working to ensure that employees in key industries have the skills needed to quickly and competently meet the changing needs of businesses. Harnessing the expertise of leaders in business, labor, education, economic development, and other sectors, Skill Panels bring competitors within a specific industry together to collaboratively address critical issues, skill gaps, training needs, and performance outcomes that affect the industry as a whole.

Skill Panel leaders build consensus, prioritize their local and regional industry workforce needs, and become better able to mobilize partners and leverage resources to make the greatest economic impact. Additionally, their mutual efforts are more influential with government, businesses, associations, and educational institutions than they would be if trying to fill workforce needs individually within silos.

As a pioneer in developing Industry Skill Panels, Washington State adopted this framework in 2000; in the past decade, Panels have expanded both to new states and to new industries within Washington State.

Industries using Skill Panels in a number of states and regions have included healthcare, construction, agriculture and food processing, information technology, electronics, energy, transportation, aerospace, and advanced manufacturing.

Some of the positive outcomes resulting from Skill Panels in Washington State include the following:

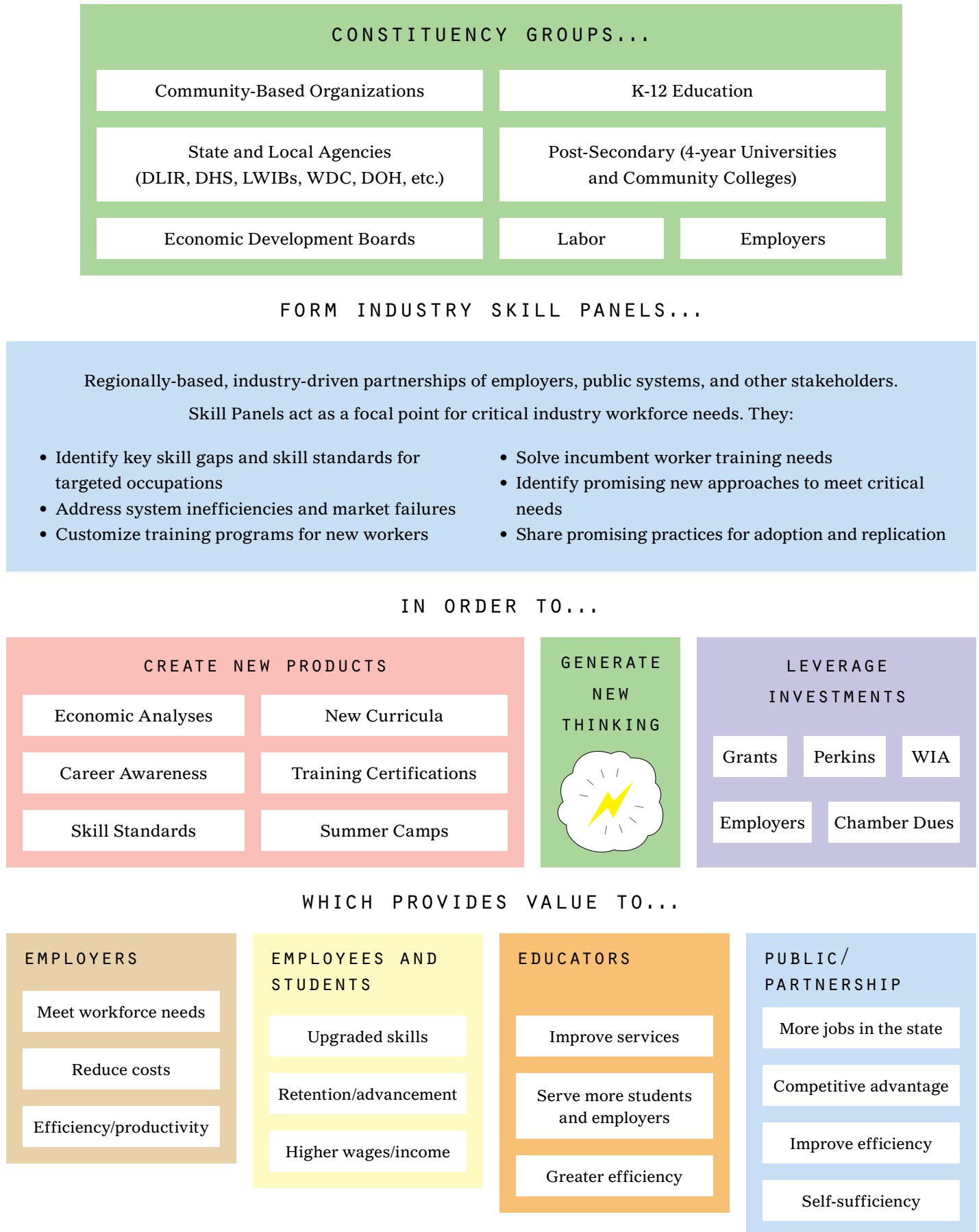
- An independent evaluation of four Skill Panels found that the initiatives leveraged over \$18 million in additional investments—more than 30 times the public funds invested.
- Over 40 Skill Panels launched by Washington State from 2000–2009 have demonstrated effectiveness in decreasing both skill gaps and vacancy rates in their industries.

An anatomy of the Industry Skill Panel model from Washington State is presented on the next page. The expectations of each constituency group in a Skill Panel are as follows:

TABLE 1: EXPECTATIONS OF SKILL PANEL CONSTITUENCY GROUPS

EMPLOYERS AND LABOR	UNIVERSITY OF HAWAII SYSTEM (HIGHER EDUCATION)
<ul style="list-style-type: none"><li>• Identify skill sets needed</li><li>• Identify skill needs required</li></ul>	<ul style="list-style-type: none"><li>• Identify training programs that would be affected</li><li>• Include private educational institutions</li></ul>
ECONOMIC DEVELOPMENT AGENCIES	LOCAL WORKFORCE INVESTMENT BOARDS AND COUNCILS
<ul style="list-style-type: none"><li>• Identify employers that should be on panel</li><li>• Identify economic development programs that may be leveraged</li><li>• Assist in understanding the labor market when attracting outside companies to come to Hawaii and establish a business</li></ul>	<ul style="list-style-type: none"><li>• Identify job-training dollars</li><li>• Identify training programs</li></ul>
DEPARTMENT OF EDUCATION: K-12	COMMUNITY-BASED ORGANIZATIONS
<ul style="list-style-type: none"><li>• Provide a resource to parents and students showing where jobs and training opportunities are located</li></ul>	<ul style="list-style-type: none"><li>• Identify training funds and programs</li><li>• Provide case-management for clients</li><li>• Understand the needs of the client</li><li>• Identify job-training programs and opportunities</li></ul>

TABLE 2: ANATOMY OF A SKILL PANEL



Nurturing the Software Development community in Hawaii is not only a benefit to the stakeholders within the community, but also for the larger economy. Being a knowledge-based industry, the industry does not burden the environment or divert resources from the Tourism industry. As software does not involve manufacturing or warehousing, it is not sensitive to geographic remoteness in the same way manufacturing is.

Also, the industry requires relatively small amounts of capital to take a product from seed development stages to market. In terms of economic impact, Software Development companies create jobs with significantly higher wages than even average salaries for college-educated professionals.

Despite these favorable factors, in some ways very little has changed for the Software Development sector in Hawaii in the last decade. The critical mass of business opportunities and employment that Hawaii could have developed has not been achieved. Therefore, the participants at the Skill Panels wanted to address several questions, including: What is preventing growth in this sector? What is lacking to realize the identified potential?

While lack of capital may be partially responsible for diminished growth of any industry sector, it often is not the main factor. Even when funding has not been an issue, software companies have struggled to grow because, executives report, they could not find sufficient numbers of qualified candidates to fuel that growth. Observers in the industry point to one key problem: the gap between the educational system responsible for the workforce pipeline and the actual workforce needs of the Software Development industry.

As the industry has matured, it has experienced some big successes around which the rest of the industry could rally—such as the emergence of several well-known business leaders, including Henk Rogers of Blue Planet Software. Rogers is a proud alumnus of the University of Hawaii at Manoa in Computer Science who started his software company at the Manoa Innovation Center, operated by the HTDC. Aided by MIC's close proximity to the university, Rogers established relationships with students and alumni; however, when he started several

new software companies, he had to recruit many of his employees from the U.S. mainland. He raised this concern as a member of the advisory group for the UH College of Engineering and formed a subcommittee of interested community leaders to examine the problem and address the workforce gap.

During the same time period in 2010, the WDC, an agency within the State Department of Labor and Industrial Relations, was launching Industry Skill Panels, which are collaborative multi-disciplinary groups that tackle industry-wide issues. The first Hawaii Skill Panels, launched in September and November of 2010, focused on the Healthcare sectors of Nursing, Long-term Care, Primary Care, Technical Disciplines and Workforce Readiness. Based on the early outcomes of the Healthcare Panels, the HTDC reached out to the WDC for support in assisting the Software Development industry.

This industry was selected to narrow the focus from the broader High Technology sector, and because Software Development had a motivated champion in Henk Rogers and other like-minded business professionals. While Software Development occurs in most large companies and is of interest to virtually all industries, a decision was made to begin the Skill Panels focusing on companies for which Software Development is the primary business activity. While the needs of small and large companies differ, the common theme is that companies create Software Development intellectual capital that is then sold to other entities. Information technology-heavy companies like universities, financial institutions, and government are heavy users of IT, but mostly for internal purposes in order to improve efficiency.

Also not addressed in this first Skill Panel meeting were the issues of IT security, system administration, and network architecture. These areas should be considered for future Skill Panel discussions, given the trend of convergence of different sectors. Taking an integrated approach to workforce development across a number of industries can help further the state's policy and market-driven goals for projects like the Hawaii Clean Energy Initiative. The efforts to establish the "smart grid" system in Hawaii will require highly-specialized workers for the energy sector.



The Executive Committee sought to gain a solid understanding of the challenges facing the industry, the development of actionable items that would address these challenges, and the establishment of an ongoing environment for continued discussions and opportunities for collaboration.

The goals for the Skill Panels were to:

- Promote and grow the state of Hawaii as a center for Software Development;
- Educate government and community leaders about the importance of the Software industry to the local economy and the need for a quality workforce base;
- Work with educational institutions to ensure the Hawaii-based Software workforce is being prepared for the “jobs of tomorrow”; and

- Offer solutions and assist with implementation of initiatives that grow Hawaii's Software industry.

The WDC approved the use of strategic planning funds in order to launch four Skill Panels for Software Development:

- **NEW SOFTWARE DEVELOPER:** This Panel covers the requirements of a new or recently-graduated Software Developer.
- **EXPERIENCED SOFTWARE DEVELOPER:** This Panel covers the requirements of a Software Developer with at least 7 years of experience, often with management experience.
- **SMALL COMPANY/START-UP:** This panel covers requirements of the small company. This is often a start-up company that has been in existence for less than 5 years.
- **LARGE COMPANY:** This panel covers the requirements of an established company. They have more employees than a start-up and will have the resources to invest in training new employees—meaning, they are more likely to hire a new Software Developer. They will often have been in existence for more than 5 years.

Members for the Panels were solicited using best practice models that encouraged representation from employers, educators, economic development organizations, labor organizations, and the workforce development system (Local Workforce Investment Boards and One-Stop Centers). Additional members were sought from professional and trade associations and government agencies such as the Department of Business, Economic Development, and Tourism. Skill Panel membership lists are included after each Skill Panel Overview in this report.

The WDC and HTDC identified key speakers and developed the agenda, leveraging the experience from the Healthcare Skill Panels. An overview of this type of workforce development initiative was presented by Kristina Hudson, who founded the Washington Interactive Network as a global center for video game development. As with those Panels, the most productive and interactive time was spent in the small groups with interaction between Panel members.

In developing issues, identifying gaps, and developing a vision for desired outcomes, there were similarities among the four groups. This similarity was also found in the Healthcare Skill Panels and reflects systemic issues that require more complex, multi-stakeholder solutions.

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## COLLEGE ATTENDEES

There are significant challenges within Hawaii in promoting Software Development in local colleges and universities:

1. There is a significant lack of internships available for Software Development students, as small businesses are not able to afford the resources to train and supervise interns. These internships are essential to providing students with hands-on experience and proving aptitude to employers.
2. Gaps exist in Software Development curricula. Participants noted that some of what is taught in schools is not used in industry, while skills that are useful in the world of work are sometimes not addressed in schools' core curricula.
3. Career pathways are not well-articulated in high school and college, and this creates a disconnect when students are considering college majors. In addition, career pathways should extend beyond the college degree; Hawaii should be able to offer certification courses to allow professionals in the state to remain current with new and advanced technologies.
4. At UH, Software Development courses are taught across a number of schools and departments, including the College of Business, the College of Engineering, and the College of Natural Sciences (primarily the Information and Computer Sciences Department). This is appropriate, as Software Development skills are required in these disciplines, but it is unclear if there are consistent standards for Software Development curricula across the UH schools and departments.
5. At the University of Hawaii, approximately 10 times the number of students gain admission to the Computer

Science department as graduate in the discipline. It is unknown if there is research to explain why there is such a low yield of graduates to declared majors.

6. It is generally recognized that Software Development graduates often leave Hawaii for higher-paying jobs and career opportunities on the mainland or globally. Many are not willing to take the risks associated with working for local start-ups and small companies in particular.
7. The issue of "work-ready skills" was considered very important. Many employers expressed concern about graduates' ability to act in a professional manner and express themselves adequately in written communication. Skills considered essential for success in Software Development companies include: written communication skills, a professional demeanor, the ability to learn independently and quickly (due to frequently-updated languages and tools), collaboration skills to work on large projects, the ability to make decisions, and the ability to communicate technical details to a non-technical audience.

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## DESIRED OUTCOMES FOR ACTION PLANNING

The industry and related stakeholders need a common vision, wherein the government takes a leadership role. A primary goal should be to advocate strongly for a broadband initiative statewide. Also, everyone involved in the industry and education sectors should encourage mentoring at all levels in order to produce more graduates and professionals in the field who are willing to stay in Hawaii.

Industry must reach out to schools. One recommendation was to create a network of professionals to visit schools and speak about the Software industry as a future career choice. Adding Software Development electives where possible would also introduce students to the skills necessary to successfully enter the field.

For UH community college campuses, creating a Computer Science program using video technology with lab assis-



tants in each classroom will help to build capacity and yield a higher percentage of graduates. The UH System should also create more work-study programs that allow students to build Software Development skills prior to the job search. In addition to work-study, colleges also need to develop more robust internship programs to provide hands-on experience—these internships should be a requirement for graduation from a Software Development/Computer Science program.

Hawaii has effectively created interest in Science, Technology, Engineering, and Math (“STEM”) through the FIRST Robotics Program, in which many public and private high schools in the state participate. The state should pursue other ways to increase interest in STEM, such as additional competitions in Software Development that could increase visibility of the occupation as a career.

Partnerships between industry and education are not well-established and are often based on personal relationships rather than the attainment of common goals. Increasing collaboration could foster needed changes in

school curricula and support for more internship opportunities. In addition, investing in the continual creation and expansion of partnerships between stakeholders will increase the likelihood of success across a number of desired outcomes.

Beyond the scope of new graduates, maintaining a list of Hawaii-educated Software Development professionals who are working on the mainland or globally will provide companies with a marketing tool for new career opportunities in the state as Hawaii looks to expand the Software Development industry. The Kama‘aina Come Home program should be reviewed and changes should be made to make it relevant to today’s hiring needs in the state.

Government entities should continue their efforts to create a more competitive business environment. Having a more favorable business environment could make it easier to recruit Software Development professionals from the mainland, as the competitiveness of a state or region is often a factor in a professional’s employment decision.



The New Software Developer Skill Panel was co-chaired by Linda Rawson (Sensory Technology Consultants) and Mark Sora (Referentia) and facilitated by Ryan Tanaka (UH Center for Career and Technical Education).

## PROBLEM STATEMENTS

This Panel developed a list of problem statements concerning education and students. “New developers” include new graduates and those with up to 4 years of experience, who have not managed a project from beginning to end, and may still be learning some languages and applications.

There were concerns about high school students and graduates in the Panel discussion. Students seem to be unaware of careers in Software Development, and the field is often not considered a desirable one since there are few champions to attract student interest. There are also few hands-on extracurricular activities for Software Development like the ones available for the Robotics Program, so any potential student interest goes untapped. Even when students are interested in High Technology fields, their math skills are often too low to qualify for the appropriate majors.

Another concern is that schools lack broadband internet access. There is also a lack of success stories that would encourage students to enter Software Development programs at universities, and there is a perception that there are few Software jobs in Hawaii. Finally, higher salaries on the mainland make out-of-state career offers more attractive to many of Hawaii’s college graduates.

## DESIRED OUTCOMES

Companies should target local students attending mainland schools in a “come back to Hawaii” campaign.

Desired outcomes by the Panel include enriching students’ educational experience by providing more activities, such as competitions and internships, that give students “real life” experiences in the Software field. Business leaders also noted a need to establish minimum Developer qualifications for entry into the field, such as:

- Scripting language: Python, Ruby, Perl, or PHP
- Programming languages: C++, Objective C, or Java
- One Framework: Django, Rails, iOS, MacOS, Net
- HTML/CSS/JavaScript knowledge
- SQL knowledge (such as MySQL)
- Algorithms and data structures: Bubble Sort, QuickSort, Binary Trees, Hashing, Binary Search, Queues

## RECOMMENDATIONS

Typically, the communication skills of Hawaii’s technology students are insufficient for entering the world of work; thus, building communication skills is essential. Students also need increased math and science skills, and the Panel recommends continued STEM education outreach at the public school and university levels.

Since the state is losing talented graduates to mainland jobs, Hawaii needs to further develop a technology- and innovation-friendly culture, beginning with highlighting innovators in the region. To assist in this effort, UH should create cross-discipline programs at the undergraduate level, such as business/technology offerings, that prepare

students for work in the field. Currently, there is local-area resistance to automation and custom development work; easing this resistance could increase the need for developers in the state and help to develop a critical mass of technology workers.

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## NEW SOFTWARE DEVELOPER SKILL PANEL MEMBERS

**CHAIR:** **Linda Rawson**, Senior Software Engineer/CEO, Sensor Technology

**Gilbert Chun**, Specialist, Career and Technical Education

**Jordan Conley**, Chief Technology Officer, ProService Hawaii

**James Dire**, Vice Chancellor of Academic Affairs, Kauai Community College

**Jeffrey Gray**, Netcom Hawaii

**Frank Haas**, Dean, Hospitality Business and Legal Education, Kapiolani Community College

**Kimberly Haueisen**, Program Director, Maui Economic Development Board

**Brent Honjiyo**, Information Technology, Hawaii Pacific Health

**Philip Johnson**, Associate Professor, University of Hawaii

**Dan Kruse**, Faculty, University of Hawaii Maui College

**Chin Lee**, Fiscal Administrator, Center for Disability Studies

**Theresa McMurdo**, Faculty, UH West Oahu

**Mark Nakashima**, Representative, First District, House of Representatives

**Dennis O'Connell**, General Manager, ProAccounting Hawaii

**Sandra Ohara**, Director of Corporate Accounts, Gov't. Contracts, Adecco

**Robert Rekward**, President, Tsunami Marketing

**Kevin Roe**, Application Engineer, Maui High Performance Computer Center

**Henk Rogers**, Entrepreneur, Blue Planet Software

**Tim Stuck**, Faculty, Kauai Community College

**Ryan Yamamoto**, Vice President, Healthcare Solutions, DataHouse

**Jim Yoshida**, Interim Dean, Career and Technical Education, Hawaii Community College

**Gayle Ishii**, Education and Academic Support Specialist, UH Community Colleges

**William Albritton**, Instructor, Computer Science, Leeward Community College

The Experienced Software Developer Skill Panel was chaired by Daniel Leuck (Ikayzo) and facilitated by Signe Godfrey (WDC).

An “Experienced Software Developer” was defined by the group as having 7–10 years of experience successfully managing projects from beginning to end, and having experience with modern Software Development methodologies such as Agile, Scrum, etc. For a position in research, the Developer should have a graduate degree.



## PROBLEM STATEMENTS

This Panel developed the following list of problem statements:

1. **BRAIN DRAIN:** Achieving a labor market with sufficiently-skilled Software Developers who can meet the current and future needs of Hawaii remains difficult. Due to a lack of competitive pay, top students often leave Hawaii for better career opportunities on the mainland. Contributing to this exodus is the fact that there may not be a viable ecosystem of technology companies in Hawaii to provide professionals with a range of opportunities.
2. **EDUCATION GAP:** There is a significant gap between what is taught in school (university) and what technical skill sets are necessary in the employment environment. The concern is that the knowledge necessary to begin work is not being taught in school, thereby hampering the immediate hiring of recent university graduates.
3. **COMPETITIVE PAY GAP:** Software companies in Hawaii typically pay less than their counterparts in the mainland (Silicon Valley, Northern California region, etc.). Even with years of experience working in other regions, most Software Developers considering employment by Hawaii companies find the pay disparity a discouragement to accepting a Hawaii position, and so possible hires continue working on the mainland instead of coming to the islands.

4. **CAREER ADVANCEMENT:** For many experienced Software Developers, a real concern is whether Hawaii, with its nascent Software industry, is a place where a Senior Developer can grow and have a future in the industry. Although for many Senior Software Developers Hawaii is an inviting place to work, the concern is that Software Developers overall don't have a clear career path option—partly because of the lack of tech companies currently operating in Hawaii.
5. **RELOCATION AND FAILURE:** The common experience of companies trying to lure experienced Software Developers is that after the “honeymoon period,” most experienced Developers fail to adapt and end up returning to the mainland.

## DESIRED OUTCOMES

1. Identify former Hawaii residents with work experience to recruit back to Hawaii through reviving the Kama'aina Come Home program. Recruit locals attending mainland schools as interns. For employees, target those with 3–5 years experience in the field who have an interest in relocating.
2. Maintain an opt-in registry of graduates from Hawaii schools now working on the mainland that companies can use to notify former students of opportunities in Hawaii.

3. Promote educational resources to the Software industry to help update employee skills. Resources for these continuing education efforts include the University of Hawaii System and Hawaii Pacific University. Develop awareness campaigns to show professionals how to get additional certifications.
4. Expand work-study and internship programs that allow students to develop valuable skills while in school. Kapiolani Community College has been successful at developing these opportunities—other schools should develop more of these programs.
5. Offer additional Small Business Innovative Research/Technology Transfer state matching incentives for companies that bring in a Junior Developer to be mentored by a Primary Investigator (a researcher in charge of a project).

Industry outcomes that will help build workforce strength include providing more competitive wages and encouraging companies to provide Software Development professionals a broad range of experience in the field that

prepares them for upward mobility. There is also a continuing need to develop a viable ecosystem of technology companies; Developers often will not move to Hawaii for a position because if they later lost the position, it would be very difficult for them to find another without having to move back to the mainland.

Government entities need to partner with the industry to help technology companies land Small Business Innovation Research and Small Business Technology Transfer grants.

Finally, developing a public infrastructure for Software professionals and students could provide necessary resources. This could include so-called “Hacker Spaces” on each island, which are furnished centers with sufficient hardware and software available to encourage professionals to share ideas, work on problems, foster technology improvement, and “play.”

The Panel concluded the session by noting that the members could continue the discussion using existing social networks such as TechHui.

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## EXPERIENCED SOFTWARE DEVELOPER SKILL PANEL MEMBERS

CHAIR: **Daniel Leuck**, CEO, Ikayzo

FACILITATOR: **Signe Godfrey**, Vice Chair, WDC

**Joseph Breman**, President, IUE Tech

**Valerie Caesar**, Owner, eSearch Hawaii

**Harry Edwards**, Computer Science Chair, University of Hawaii, Hilo

**Lynette Hanashiro**, Human Resource, Hawaii Health Systems Inc.

**Kazayuki Hashimoto**, President, Blue Mars/Avatar Reality

**Peter Kay**, President, Cyber Com Inc.

**Kevin Kimizuka**, One-Stop Manager, WDD Maui

**Brent Norris**, Entrepreneur/Web Developer, IT Business

**Benjamin Owen**, President, Owen Environmental Inc.

**Steve Singer**, Program Coordinator, IT Program, Kapiolani Community College

**Scott Murakami**, Director, PCATT

**Juanita Lauti**, Human Resources, Hawaii Health Systems Inc.

**Debi Merwick**, Chief Operating Officer, Bishop & Company

The Small Company/Start-up Skill Panel was co-chaired by Russel Cheng (Asia Pacific Films) and David Takeyama (Oceanit) and facilitated by Nina Enomoto (UH Center for Career and Technical Education).

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## PROBLEM STATEMENTS

The problem statements developed by the Panel focus on the efforts of small companies and start-ups to identify and recruit professionals. Especially for the small company, it appears there is a small talent pool locally, since new graduates and professionals often leave and do not return to Hawaii. Panelists noted that the culture in Hawaii needs to change from “not losing” to “winning” in order to develop a sharper competitive edge. Potential hires need to understand that self-motivation and flexibility are paramount when working in a small company. Panelists noted that “local graduates and professionals are not good at marketing themselves,” and that the “local culture” may promote a lack of drive to succeed, as workers know they can fall back on parents and family for support.

Mainland software companies play a role in the Hawaii situation, as they actively recruit in the state, and students seem to respond to recruitment efforts instead of conducting their own broad searches that could identify local companies. Salaries are also an issue; small companies are unable to match larger company and mainland salaries (which are up to 30% higher). Overall, there is a lack of leadership to build the industry and infrastructure that is needed to support small companies and start-ups.

A Panel member from Kauai noted that it is hard to find qualified professionals on his rural island—he called it a “brain drain.” Often, companies prefer to hire contractors because they can find immediate skill matches for their small companies. Especially in Hawaii, there is a sense that local companies do not want to take risks and need a “perfect fit” before they consider employment. On the other hand, local graduates are looking for experience, and may have had a non-traditional path that requires companies to presume the individual’s potential. Because of the nature of most Software jobs, Software companies have the additional option to hire overseas Developers, often at reduced costs.



Software Development is a perfect setting for entrepreneurship, but the local culture can be a hindrance to this expansion. There is a general lack of know-how about starting a company and identifying incentives and rebates that could assist in funding a start-up. Lack of capital often prohibits activities past the start-up stage.

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## DESIRED OUTCOMES

Desired outcomes of the Panel members included a resolve to rally around a common vision, such as to make high-speed Broadband available in most, if not all, areas of Hawaii by 2013. The members also agreed to investigate forming a network to reach out to schools and talk to students about the Software industry. As part of this network, professionals will need to be mentors and take on more leadership roles.

A number of solutions were identified by Panel members:

1. Legislate for Broadband, including the “last mile” infrastructure. Hawaii currently ranks 49th in the country in terms of Broadband development.
2. Establish a solid vision for the industry—Montreal’s gaming industry was mentioned as a model.
3. Survey mainland companies (including the Russell 2000) to determine what it would take to encourage their companies to relocate to Hawaii. Develop metrics to assist in demonstrating the benefits of Hawaii as

- a place to do business. Hawaii needs to publicize the Technology industries in the state more effectively.
4. Identify a champion within state government to better understand the Software industry and to advocate for government and legislative initiatives that will benefit the industry. Forge more university/industry collaborations, including more events like the Skill Panels and the state's Science Fair.
  5. Frame the current Software industry as an anchor or cluster in order to attract more small companies and start-ups from within and outside of Hawaii.
  6. Encourage UH and other universities to attract world-class talent for Software Development.
  7. Establish "speed dating" events with local universities to introduce students to industry professionals.
  8. Establish a mentorship network for young entrepreneurs, new graduates, and young professionals. Develop mentorship training and activation. House some full-time mentors at innovation centers.
  9. Further fund entrepreneurship schools and programs with funding for the Y-Combinator Model, an accelerator that selects applicants to bring together to develop a software idea that, at the end of the program, the team will pitch to potential investors. As the team is developing their software idea, they are also mentored in all aspects of business, providing additional value to program participants.
  10. Create non-traditional education and training models, including two-year degree and certification programs.

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## SMALL COMPANY SKILL PANEL MEMBERS

CO-CHAIRS: **Russel Cheng**, Asia Pacific Films

**David Takeyama**, Information Technology Manager, Oceanit

FACILITATOR: **Nina Enomoto**, Coordinator of Student Affairs, CTE

**Ryan Esaki**, Entrepreneur

**David Fisher**, Founding Member, Maui Venture Consulting

**Sean Fox**, Managing Partner, New Horizons of Hawaii

**Roderick Hinman**, Principal, Aurora Research LLC

**Gaye Ishimaru**, Director, HIWEDO

**Clyde Sakamoto**, Chancellor, University of Hawaii Maui College

**Steven Squire**, Owner, Sky Farm 808

**Glen Tanigawa**, Data Acquisitions Manager, Collateral Analytics LLC

**Karen Yamamoto**, President, Decision Research Corporation

**Sydney Yamane**, Founder, Kauai Internet

**Rick Young**, Marketing Support Administrator, Decision Research Corporation

**Martin Zorn**, Administrative Officer, Kamakura Corporation

**Galen Sasaki**, Associate Professor, University of Hawaii-Manoa

**Mark Osman**, Scrum-Masters

**Tricia Malloy**, Program Specialist, WDD

**Jason Hoffman**, Business Consultant, The Strategic Allies

**Guy Toyama**, Executive Director, Friends of NELHA

**Rolanse Crisafulli**, WorkHawaii Division Administrator, Oahu Workforce Investment Board



The Panel was chaired by Shawn Taras (Tetris Online) and facilitated by Phyllis Dayao (Career Kokua, Department of Labor and Industrial Relations).

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## PROBLEM STATEMENTS

This Panel developed this list of problem statements:

1. The primary issue in large companies is the lack of skilled, experienced Software Development professionals available locally, meaning companies have to rely heavily on mainland and global importation of talent.
2. Transient workers tend to stay 2–3 years and often cite cultural differences, the high cost of living, and their spouses' inability to find jobs as the reasons for high attrition.
3. Large companies outside the Software industry that rely on Software Development expertise frequently require credentials and certifications that specifically relate to the core business mission and function—this situation reduces the flexibility of Developers to access other jobs outside the Software industry.
4. The needs of Software companies go beyond Developers and include Sales and Marketing, Graphic Artists, Sound Artists/Musicians, IT staff, Translators, Writers, and Web Designers. These needs are not always addressed when companies look to Hawaii as a possible location.
5. Skill needs for large companies go well beyond basic or leading-edge knowledge. Companies sometimes require

employees to know older skill sets that are no longer taught at the university level. It is NOT advisable for the industry to dictate that the educational institutions teach specific languages; it is more important to teach the techniques of Software Engineering and Development. However, it is good to have open communication with educational institutions and instructors about trends and major languages or topics that are often required of commercial Software Development. These needs include:

- Linux OS;
- Flash (especially for Game Programmers);
- JavaScript languages, including C# and C++;
- Applications development;
- Incorporating servers; and
- Use of peripherals such as iPad, iPhone, and Android.

Furthermore, employers are also looking for “soft skills” requirements, including the ability to work as a team and meet project deadlines, as well as solid math skills. Soft skills manifest in different forms in different industries. In Software Engineering, coding in a team would require the individual to practice collaborative Software Development skills such as reviewing a colleague’s code, reporting bugs, and checking-in and commenting on code.

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## DESIRED RECOMMENDATIONS

There were a number of recommendations on how to increase the pipeline of skilled Developers for the Software industry in Hawaii. Foremost of these was to strengthen existing partnerships, and create new partnerships, between industry and educational institutions.

1. Revive the Kama’aina Come Home program to identify former Hawaii residents who may be willing to return to the state for job opportunities.
2. Create a database of educational programs, courses, and standards from schools in the state and provide the list to companies in Hawaii for them to review and recommend changes.
3. In addition to generic Software courses, there should be additional coursework offered in areas that are

important to the state, such as Software Development for Healthcare.

groups, businesses, and programs and courses required for employability.

4. Schools are an important part of the pipeline for Software Development. Ideas to help strengthen the education–business partnership include:

- Building a database of student résumés from local universities in order to create internship opportunities;
- Having working professionals visit schools and encourage students to investigate the field and remain in Hawaii after graduation;
- Creating mentorship programs that would help students get the appropriate education and identify local opportunities;
- Having industry professionals participate in career fairs to increase visibility;
- Building a career web portal, similar to that for green jobs, that can be implemented by industry, education, and the workforce development sectors. The portal could take students from high school to college to the workplace, and include directories of High Technology organizations, professional

- Offering senior projects in high schools for Software Development as a way to involve industry professionals, build a pool of employers and businesses, and provide recognition through the Career Pathways process.

5. Encourage companies to develop in-house talent and skills, including continuing education to stay current in new technologies.
6. Providing incentives and funding streams for businesses to offer internships may help students develop needed skills and encourage them to stay in Hawaii after graduation.
7. As a consortium, industry and government should participate in tradeshow and other opportunities to promote Hawaii as a place to relocate (this has been successfully done in a number of other states). A larger critical mass of companies will also encourage more mainland professionals to move to Hawaii. In addition, a public relations campaign to create awareness of the software industry in Hawaii can assist in the effort to recruit more companies.

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## LARGE COMPANY SKILL PANEL MEMBERS

CHAIR: **Shawn Taras**, Executive Producer, Tetris Online

FACILITATOR: **Phyllis Dayao**, Supervisor, Career Kokua

**Joanne Agnes**, Corporate Office, Human Resources, Hawaii Health Systems Corporation

**Roger Buss**, Chief Information Officer, First Insurance Hawaii

**Jane Ferreira**, Director of Business Development, New Horizons of Hawaii

**Mark Hoffman**, Professor, University of Hawaii Maui College

**Stephen Itoga**, Retired Professor, University of Hawaii

**Guy Kimura**, Dean, Liberal Arts and Public Services, Hawaii Community College

**Burt Lum**, Host, Bytemarks Café Radio Show

**Steve Lupkes**, Chair, Kauai Workforce Investment Board, Workforce Development Council/KWIB

**Angela Meixell**, Interim Director, Career and Technical Education

**Kathleen Nielsen**, Executive Director, Hawaii County Workforce Investment Board

**Chad Ohira**, Software Engineering Manager, BAE Systems, Spectral Solutions

**Shawn Reese**, General Dynamics

**Rosemary Sumajit**, Interim Director, PCATT, Leeward Community College

**Ray Tsuchiyama**, Senior Advisor, Google Japan

**Derek Kanehira**, Human Resources Manager, First Insurance



Since the meetings on March 31, the Software industry in Hawaii has been actively working on the proposals made by the Skill Panels. Activities that were spurred by the meetings include:

1. A coders committee, led by Henk Rogers and fueled by some of the participants of the Skill Panel meeting, will meet on a monthly basis to discuss and prioritize the challenges and solutions that came out of the Skill Panels.
2. A monthly networking event for Software Developers of all ages (including students aspiring to be professional Software Developers) has been co-founded by HTDC and Blue Planet Software. Originally called the “Thirsty Third Thursday,” the event is sponsored by a stakeholder within the Software Development industry and organized by HTDC to bring Software Developers together in a social setting to encourage a free flow of ideas and collaboration, especially between academia (professors/instructors and students) and industry members. The website for the event is <http://www.htdc.org/thirsty>.
3. A TechHui forum has been created in order to continue the discussion and widen the circle of participants beyond those who attended the Skill Panel meeting. The forum is online at <http://www.techhui.com/profiles/blogs/developing-a-viable-software>.

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## RELATED ACTIVITIES AND RESOURCES

The Skill Panels also brought attention to some related activities and resources that already exist, including:

1. **TECHHUI:** A virtual grassroots network of technology enthusiasts, which hosts a variety of forums and groups discussing technology issues, ranging from Ruby software development and gamification to the Small Business Innovation Research grant and tech start-up funding. The site also lists local software and other tech-related events, and hosts an annual conference of the same name with multiple tracks surrounding software and technology. More information is online at <http://www.techhui.com/page/conference2011>.
2. **HOLIDAY TECH FAIR:** Organized as a technology and job fair by HTDC, this event is held during the winter holiday season to attract students, ex-pats visiting relatives, and others to experience the growing tech sector and jobs available locally.
3. **TECHJOBSHAWAII.COM:** A free job/résumé posting site devoted to local technology jobs, sponsored by HTDC.

State of Hawaii, **Short-Term** Occupational Projections, 2010–2012

SOC code	Occupation Title	Employment in...		Growth...		Average Annual Growth	Avg. Annual Openings Due to...			Education/ Training
		2010	2012	Net	%		Growth	Replacement	Total	
–	<b>TOTAL, ALL OCCUPATIONS</b>	643,000	665,840	22,840	3.6%	1.8%	11,590	15,270	26,860	–
15-0000	<b>Computer and Mathematical Occupations</b>	8,700	9,040	340	3.9%	2.0%	170	150	320	–
15-1000	<b>Computer Specialists</b>	8,400	8,730	330	3.9%	2.0%	170	150	310	–
15-1011	Computer and Information Scientists, Research	70	70	0	0.0%	0.0%	<10	<10	<10	Doctoral degree
15-1021	Computer Programmers	860	860	0	0.0%	0.0%	0	20	20	Bachelor's degree
15-1031	Computer Software Engineers, Applications	780	830	50	6.4%	3.2%	30	10	30	Bachelor's degree
15-1032	Computer Software Engineers, Systems Software	480	500	20	4.2%	2.1%	20	<10	20	Bachelor's degree
15-1041	Computer Support Specialists	1,270	1,300	30	2.4%	1.2%	10	40	50	Associate degree
15-1051	Computer Systems Analysts	980	1,010	30	3.1%	1.5%	20	20	40	Bachelor's degree
15-1061	Database Administrators	230	240	10	4.3%	2.2%	10	<10	10	Bachelor's degree
15-1071	Network and Computer Systems Administrators	900	940	40	4.4%	2.2%	20	10	40	Bachelor's degree
15-1081	Network Systems and Data Communications Analysts	1,430	1,570	140	9.8%	4.9%	70	20	90	Bachelor's degree
15-1099	Computer Specialists, All Other	1,400	1,400	0	0.0%	0.0%	0	30	30	Associate degree

State of Hawaii, **Long-Term** Occupational Projections, 2008–2018 (Revised)

SOC code	Occupation Title	Employment in...		Growth...		Average Annual Growth	Avg. Annual Openings Due to...			Education/ Training
		2010	2012	Net	%		Growth	Replacement	Total	
–	<b>TOTAL, ALL OCCUPATIONS</b>	685,920	733,180	47,260	6.9%	0.7%	5,230	16,030	21,260	
15-0000	<b>Computer and Mathematical Occupations</b>	9,160	10,330	1,170	12.8%	1.3%	130	180	310	
15-1000	<b>Computer Specialists</b>	8,850	9,980	1,130	12.8%	1.3%	130	170	290	
15-1011	Computer and Information Scientists, Research	70	70	0	0.0%	0.0%	<10	<10	<10	Doctoral degree
15-1021	Computer Programmers	920	800	-120	-13.0%	-1.3%	0	20	20	Bachelor's degree
15-1031	Computer Software Engineers, Applications	880	1,080	200	22.7%	2.3%	20	10	30	Bachelor's degree
15-1032	Computer Software Engineers, Systems Software	510	610	100	19.6%	2.0%	10	<10	10	Bachelor's degree
15-1041	Computer Support Specialists	1,360	1,410	50	3.7%	0.4%	<10	40	40	Associate degree
15-1051	Computer Systems Analysts	1,040	1,130	90	8.7%	0.9%	10	20	30	Bachelor's degree
15-1061	Database Administrators	250	280	30	12.0%	1.2%	<10	<10	10	Bachelor's degree
15-1071	Network and Computer Systems Administrators	960	1,090	130	13.5%	1.4%	10	20	30	Bachelor's degree
15-1081	Network Systems and Data Communications Analysts	1,540	2,150	610	39.6%	4.0%	60	30	90	Bachelor's degree
15-1099	Computer Specialists, All Other	1,330	1,370	40	3.0%	0.3%	<10	30	30	Associate degree

Source: Hawaii State DLIR, Research &amp; Statistics office, September 2011

## Occupational Employment and Wages for Selected Computer Occupations, May 2010

2010 SOC code	2000 SOC code	Occupational Title	Employment	Median Hourly Wage	Mean Hourly Wage	Annual Salary
15-1111	15-1011	Computer and Information Research Scientists	80	\$46.92	\$49.40	\$102,750
15-1121	15-1051	Computer Systems Analysts*	1,000	\$31.09	\$32.29	\$67,170
15-1131	15-1021	Computer Programmers	700	\$32.35	\$33.28	\$69,210
15-1132	15-1031	Software Developers, Applications	760	\$36.32	\$37.58	\$78,160
15-1133	15-1032	Software Developers, Systems Software	390	\$41.57	\$42.70	\$88,820
15-1141	15-1061	Database Administrators	230	\$31.45	\$33.50	\$69,680
15-1142	15-1071	Network and Computer Systems Administrators*	1,200	\$30.73	\$31.73	\$66,000
15-1150	15-1041	Computer Support Specialists	1,520	\$20.83	\$22.62	\$47,060
15-1179	15-1081	Information Security Analysts, Web Developers, and Computer Network Architects	1,050	\$32.85	\$34.40	\$71,560
15-1799	15-1099	Computer Occupations, All Other*	1,140	\$37.28	\$36.61	\$76,140

Standard Occupational Classification (SOC) system codes were updated from 2000 to 2010.

\* This occupation has the same title, but not necessarily the same content, as the 2010 SOC occupation. See [http://www.bls.gov/oes/oes\\_ques.htm#Ques41](http://www.bls.gov/oes/oes_ques.htm#Ques41).

Source: Hawaii State DLIR, Research & Statistics office, September 2011

The following is a PowerPoint presentation delivered during the Skill Panel meetings by Kristina Hudson.

## ABOUT THE KEYNOTE

**KRISTINA HUDSON** has 16 years of experience in economic development, and developed the first industry cluster program that enterpriseSeattle has used as a model. Hudson has received two International Economic Development Council (IEDC) awards, one of which is the “Best Technology-Based Economic Development Program.” In the last five years, she assisted in creating over 2,500 jobs and generating over \$400 million in economic impact for the region. For several years, Kristina served as an advisor to the Washington Technology Industry Association for their program content and for their Fast Pitch Forum. She is currently the Co-Director of Industry and Innovation for the University of Washington’s Engineering Research Center for Neurological Engineering. Previously, Kristina spent 11 years with Washington State Film Office, where she worked to bring film and television production business to Washington State. She can be reached at [khudson@enterpriseseattle.org](mailto:khudson@enterpriseseattle.org).



# Overview Interactive Media Workforce Skills Panel

**Kristina Hudson**  
Director, Washington Interactive Network  
Business Development Manager, enterpriseSeattle

**[khudson@enterpriseSeattle.org](mailto:khudson@enterpriseSeattle.org)**  
**206.389.8657**



## Goals:

- ▶ To establish a current economic and workforce development baseline for the interactive media cluster
- ▶ Analyze and document the career ladders and lattices that exist in the cluster
- ▶ Develop and plan to meet the long-term workforce needs of the cluster
- ▶ Expand the marketing and communication strategies regarding the importance of the cluster to the regional economy

## Participants:

- ▶ Over 60 people participated in this study representing their company or educational institution
- ▶ 19 educational institutions (Private & Public)
- ▶ 41 industry representatives
- ▶ 6 non-specific industry participants

## Define Term

- ▶ What does it mean to industry?
- ▶ What does it mean to schools?

## What is Interactive Media?

- ▶ Interactive Media is a term that the video game industry uses to describe itself.
- ▶ Schools have a much broader definition that includes other applications of skills used in game development: web-based applications, special effects, advertising, filmmaking, etc.
- ▶ We determined which skills are needed to do which jobs that employ people with these interactive media applications.
- ▶ Game development is the most complicated application for the knowledge and skills learned by interactive media students.
- ▶ Students could learn these skills using the games as the application, those same students could get jobs in any of the other industries that use similar applications.

## Goal #1:

- ▶ To establish a current economic and workforce development baseline for the interactive media cluster

## Evaluating Current Industry

- ▶ What is the current size of the industry in terms of jobs?
- ▶ What is the current size of the industry in terms of dollars it brings to the local economy?
- ▶ Of the established firms who are hiring, what positions are open?
- ▶ One-on-one interviews and online surveys

## Industry Surveys & Interviews

- ▶ What positions are the hardest to find?
- ▶ Do you compete with other industries for workforce?
- ▶ What schools are you hiring from?
- ▶ Do the new graduate hires have the technical skills in the appropriate tools to meet minimum job requirements.
- ▶ What soft skills are needed for the job (Programming, Artistic, Business)?
- ▶ As tools evolve, how are employees learning the latest technologies?

## Current Economic & Workforce Baseline

- ▶ 2007 economic impact study was conducted
- ▶ Washington State's Interactive Media Industry consisted of more than 150 companies, 15,000 employees, and brought in \$4.2 billion in revenues to the region
- ▶ 2010 Study shows there has been a 14% growth in the Puget Sound Region among established firms (excluding Microsoft). Specifically, Seattle companies had a 33% growth
- ▶ Of the established firms evaluated and surveyed, over 50% of the firms were hiring.
  - 61% of the jobs are Programmers/Software Engineering
  - 17% are Artists and Graphic Designers
  - 22% of the openings are Administrative and Project Managers

## Labor and Hiring Challenges

- ▶ Engineers and programmers: This industry competes for talent with many other industries. Simply not enough programmers with the right skill sets and programming knowledge to meet minimum job requirements.
- ▶ Artistic capabilities and technology specialists are not always found in the same person. There are not enough artists that have both traditional and technical skills in the appropriate tools to meet minimum job requirements.
- ▶ New hires often lack product-oriented and business focus.
- ▶ Rapid individual learning is required while the product is live and functional.
- ▶ Team work is imperative.

## Goal #2:

- ▶ Analyze and document the career ladders and lattices that exist in the cluster

## Career Ladders and Lattices

- ▶ Challenge: Companies use different titles for similar positions
- ▶ Companies challenged with defining roles vs responsibilities
- ▶ Identified each of the following for 51 position titles and 40 specialties:
  - Summary of the job, specific accountabilities, scope of work, assignment of work, strategic input, complexity and problem solving, interactions and negotiations, oversight received, and experience and skills.
- ▶ Entry level positions identified are:
  - Associate Programmer, Scripter, Associate Artist, Associate Producer, Audio Engineering I, and Quality Assurance.
- ▶ Organizational Charts and Studio Head Career Path

*Continues next 9 pages . . .*

# Entry Level Positions

Job Tiers and Ladders	High Level Job Description	Tools	Minimum Education/Years	Skills Needed
<b>Programming (aka. Engineering)</b>	Creates all code for the game, from client to server and including any tools needed to integrate game content with game systems – Programmers make it work.	C, C++, C#, SQL, AJAX, Python, LUA, Ruby on Rails, HTML, APS, Java, ActionScript, Flex		Linear algebra is a must!
Associate Programmer/Programmer I	An entry level programming position. Generally tends to work on tools and system support. Requires the direction of seniors. Assists in developing, writing, and debugging implementation code for assigned software projects. Coordinates and participates in product testing and maintenance activities. Must have basic problem solving skills. Interacts with team members and peers and may interact with vendors to explain or provide semi-routine information related to assigned activities. Work is subject to close supervisory review at frequent intervals.	PHP, LUA, Python, & Advanced Web Skills	4 year Degree CSE or similar or have modded games successfully; Modders will have built their own game (s) or have worked on modded games with a team; if appropriate, indicate the rank given by the mod sites of your game.	Experience in tools listed, be proficient in the ones that the company uses. Also should have projects that they have done beyond the classroom that shows their passion for the industry.
Scripter	A type of programmer that works closely with game design to execute game behaviors. A Scripter in this unit would be learning more core languages and heading toward client or C development.	LUA, & Python	Could be an AA degree heading in the direction of a CSE degree. Modders will have built their own game (s) or have worked on modded games with a team; if appropriate, indicate the rank given by the mod sites of your game.	Each studio has their own way of placing this position and to whom they report. Sometimes it lives in the design department, sometimes programming, sometimes it depends on the career aspirations of the individual.
<b>Design</b>	Define rules and storyline for the game, generate levels, balance and tune the game – Designers make it fun!	The Game Engine (e.g. Unreal 3), scripting tools like Python or LUA, occasionally 3D tools like Maya or 3DMax		
Associate Game Designer/ Game Designer I	Entry level position: usually works to find new ways to re-use existing assets. For example, take an existing level and add new missions to the space. Work is very task centric and could involve very tactical day-tasks like data entry or auditing	Experience on game engines (i.e. UE3, Source, Flash, Unity, etc.)	QA can lead to this: or have worked on existing titles, and/or level design experience, and/or mod work (can do work on the free engines); need a game portfolio	Understanding of games - what makes them good? Why do some fail?; experience in partner relations
Scripter	A type of programmer that works closely with programming and game design to execute game behaviors. A scripter who's end result is game play will most likely be in the game design department.		Entry level position (see scripter description in programming area)	Each studio has their own way of placing this position and to whom they report. Sometimes it lives in the design department, sometimes programming, sometimes it depends on the career aspirations of the individual.
<b>Art</b>	Art probably has the most varied and extremely specialized taxonomy. Essentially artists create all visual assets for the game...everything you see – artists make it pretty/cool.	Photoshop, Maya, 3D Max, Softimage, Z-brush, Mudbox, Motionbuilder, Painter, AfterEffects, Flash, game engine tools		
Associate Artist	Entry level position: Assists in the design and creation of artwork for assigned aspects of products: make LODs (Level of Details), clean up models, make props; Be great in two of the tools -ideally the ones that the company uses. In the Casual Game Industry, these artists work on storyboards, characters, 2D art, hand sketching, etc. This position may digitize or scan pencil drawings. Renders digitized animated drawings in color. Cleans up artwork. Executes background drawings. Assists in the creation of story boards. Work comes in short-term tasks that require the use of some independent judgment outside of established procedures. Work is subject to close supervisory review at frequent intervals.		3-4 year education in entertainment art and of progressively complex related experiences.	strong portfolio, be strong in the applications that the employer uses. Keep a web-based portfolio and bring a physical portfolio to the interview. Ideally with different examples of your work that are not online. Show group projects as well. Basic problem solving skills needed.
<b>Producers</b>	Producers manage day to day tracking and cross team communication. They identify blocking issues and make sure people are alerted to work stoppages. - Producers make it happen.	Excel, Project, JIRA, any type of schedule tracking software		
Assistant Producer	An entry level position that can vary in task from day to day. It's really a gopher position. The AP needs to be very flexible but organized and detail oriented. Strong communications skills with engineering talent and ability to work with a team.	General Office products: Excel, 3-4 year education; can also come from QA		
<b>Community Management</b>				
Volunteer Community Manager	This person is pulled from the existing game community; They LOVE games; must show aptitude; In most companies this is a strategic role and requires more experience (see above). Volunteer Community Managers can move to assistant positions.			Often this person reports to the marketing group or to the studio manager.

# Entry Level Positions

## Quality Assurance

QA Associate Tester/QA 1

Quality Assurance tests the functionality and integrity of the pre-released versions of the software.

Entry level position; This position spends most time in assigned game playing activities and contributes to, but does not independently prepare bug reports. Usually works on short term tasks with highly defined procedures. This position need to show up on time, follow instructions; excellent written skills for tracking bugs; efficient interactions and excellent listening skills.

0-1 year of experience

Usually reports to the COO or Studio Head

This position could move into all other entry level positions. Usually this position reports into production, but could be an entry to other areas.

## Quality Assurance Engineering

Quality Assurance Engineer/QAE1

Designs and writes Quality Assurance software programs that run quality assurance procedures to test the functionality and integrity of pre-released versions of software.

Usually experienced in an area of specialization. Tests software code. Develops and executes test plans on pre-release and current versions of software. Identifies and articulates problem areas within assigned software products. Solves problems with QU automation and the applications. Work is subject to regular supervisory review at regular intervals. Operates within the context of generally defined procedures.

4 year degree or 3-6 years of progressively complex related experience

## Audio

Associate Sound Designer/Sound Designer I

Responsible for all the sound in the game and falls under the Art Track

Pro Tools/Nuendo/Vegas - Audio recording, mixing and sound design  
Logic/Cubase/Sonar/Pro Tools - Music composition

Sound Forge/Wave Edit/Peak/DSP Quattro - sound editing

WWISE/FMOD/XACT/SCREAM (middleware for implementing audio)  
Excel skills a must.

Recognized audio program: Vancouver Film School: <http://www.multimedia.edu/fulltime.php?id=11>

AA or 4 year degree, with progressively complex related experience.

Knows traditional media and tools. Has basic problem solving skills for semi-routine problems. Interacts with team members and peers and may interact with vendors to explain or provide semi-routine information related to assigned activities.

# Career Progression (Art)

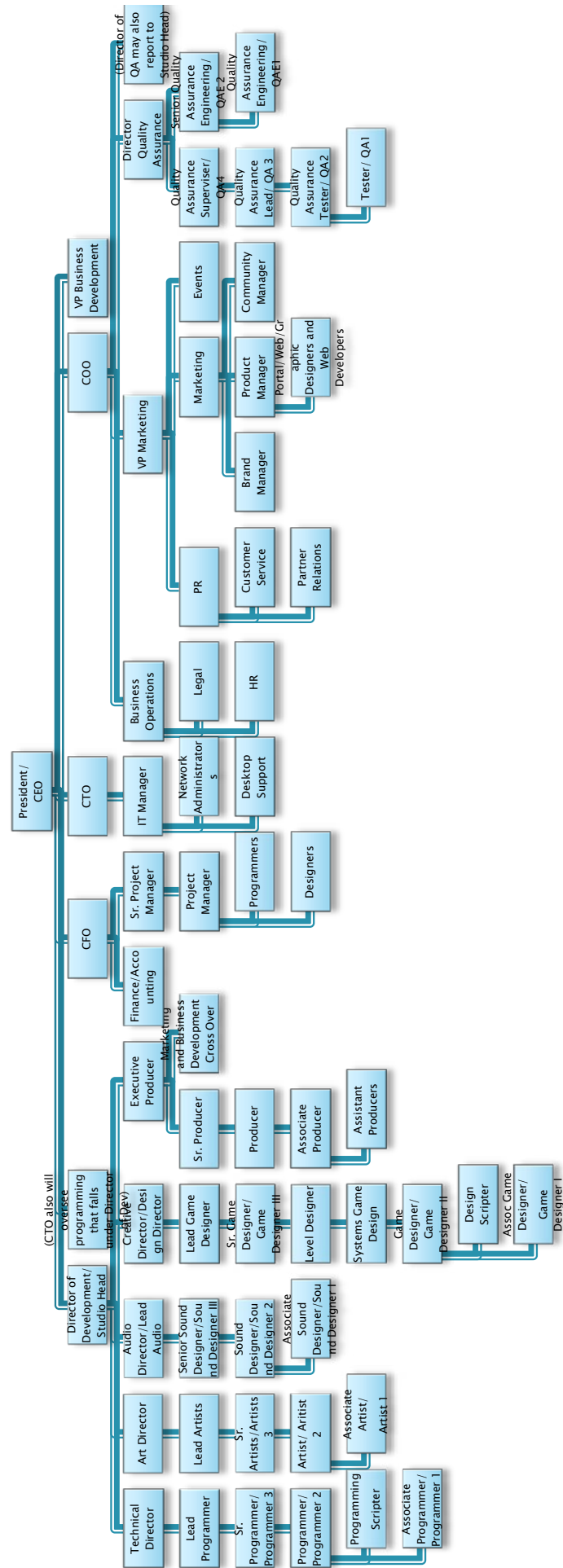
Job Tiers and Ladders	High Level Job Description	Tools	Minimum Education/Years	Skills Needed
Art	Art probably has the most varied and extremely specialized taxonomy. Essentially artists create all visual assets for the game...everything you see – artists make it pretty/cool.	Photoshop, Maya, 3D Max, Softimage, Z-brush, Mudbox, Motionbuilder, Painter, AfterEffects, Flash, game engine tools		
Associate Artist	Entry level position: Assists in the design and creation of artwork for assigned aspects of products: make LODs (Level of Details), clean up models, make props; Be great in two of the tools - ideally the ones that the company uses. In the Casual Game Industry, these artists work on storyboards, characters, 2D art, hand sketching, etc. This position may digitize or scan pencil drawings. Renders digitized animated drawings in color. Cleans up artwork. Executes background drawings. Assists in the creation of story boards. Work comes in short-term tasks that require the use of some independent judgment outside of established procedures. Work is subject to close supervisory review at frequent intervals.		3-4 year education in entertainment art and of progressively complex related experiences.	strong portfolio, be strong in the applications that the employer uses. Keep a web-based portfolio and bring a physical portfolio to the interview. Ideally with different examples of your work that are not online. Show group projects as well. Basic problem solving skills needed.
Artist I	Designs and creates artwork for assigned aspects of products. Experienced in area of specialization, and may train junior staff members. Creates concepts and art for software products that meet art direction. Creates story boards. Executes background drawings and character design. May animate characters. Interacts with internal and external peers and/or managers. Generally work on art tasks that can be completed in a day or two. Work is subject to regular supervisory reviews.		3-6 years	Semi-complex problem solving skills needed.
Artist II	Somewhat experienced artists who works on larger and more complex pieces, often requiring interaction with other artists and designers. May set the style for art on products, designs and creates artwork. May train junior members of the staff. Creates artistic concepts and art for software products that meet art direction. Creates story boards. Executes background drawings and character designs. Works directly with producers.		5-8 years	Lighting specialists needed!
Sr. Artist / Artist III	An experienced artist who works on showcase pieces that are the most complex, usually requiring direct interaction with game designers and other artists. Sets the style for art on products, designs and creates leading-edge artwork, and provides artistic and technical leadership. Drives the creation of new artistic concepts, designs and/or technologies and works on projects that span several products. Sets the artistic look across the organization's products and characters. Responsible for level productivity and help embody the Art Director's vision. Responsible for budget. Manage personnel and assess new talent. Work is regularly reviewed. May determine new technical or artistic approaches and/or develop major new technical tools. Often will "Evangelize" new ideas/technologies/solutions to a wide range of audiences.		8-12 years	Successfully shipped titles, increased scope of influence on projects; Ability to mentor junior artists; Experience and understanding of game design; Solves unique problems.
Lead Artist	Designs and creates art for software products and leads other artists on assigned projects. Manages and leads a team of specialists, e.g. Environment Lead, in the creation and implementation of art for assigned products. Works closely with producers, designers, and programmers. Manages schedules and budgets for assigned products. Coordinates the work of vendors. Tracks the daily work of the team. Interacts with subordinates, peers and/or managers in other work groups. Teaches, trains and interprets data and resolves routine issues. Work is reviews at milestones.		5+ years with 1 or more years of management or team lead experience.	
Art Director	Directs the art department in the design and development of art for software products. Sets style and artistic vision for the game (possibly the brand), directs team toward vision. Works with Design Director/Creative Director to make sure vision best represents game play, works with technical director to determine what is achievable within technical constraints. Presentations to press and events. Works with licensed or new IP. Principle point of contact for licensed IP. Manage personnel and internal education. Works with external vendor partners (outsourced work). Works both internally with executives and management, and with third parties. Develops and implements quality assurance protocols for artwork. Accountable for the management of the unit. Ensures ongoing training for direct reports. May build and enhance internal and external contacts. Work reviewed relative to attainment of the operating goals of assigned organization unit.		10 years with 5 years of management experience	Shipped successful titles; Many years in the industry; Scheduling experience;

# Specialties

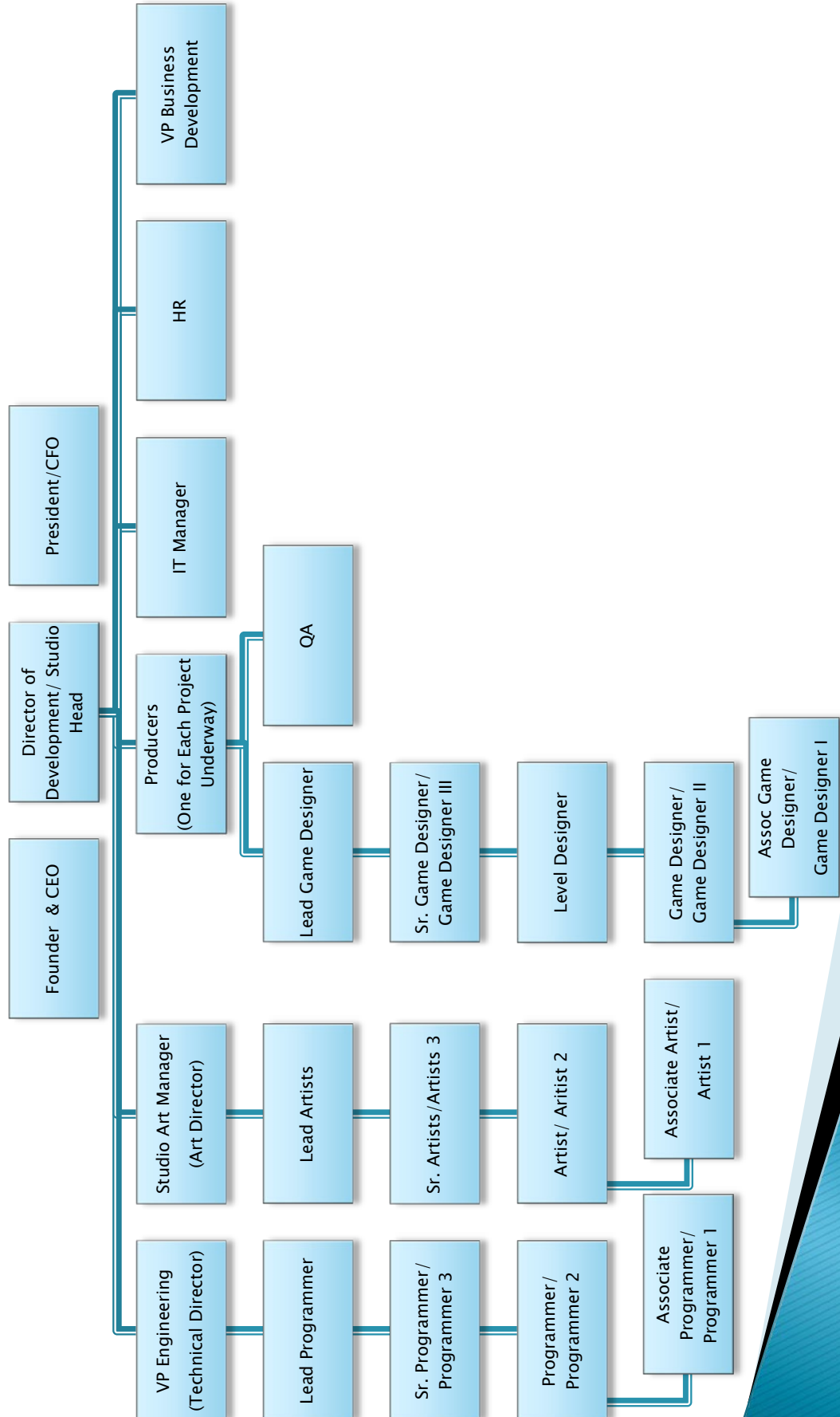
## (Art)

Specialties	Many artists are good in at least a couple specialties
- 2D Artist	Extreme focus on traditional aptitude...drawing, painting, color theory, design, composition
- Concept Art / Story Boards	Works closest with art director, makes inspirational art as well as very functional guidelines for the production team to follow
- Storyboards	Specialized in telling a story in cinematic terms, helps animation team and level design team to pre-visualize ideas before engaging in time-intense labor
- Textures	Strong painting and color skills required, needs to be able to render out many different types of surfaces
- 3D artist/modeler	Creates the 3D geometry for game assets
- hard surfaces (vehicles and weapons)	Vehicles and weapons require exact precision and attention to detail
- environment	This can cover anything from natural terrain and flora to buildings and architecture
- character	Organic modeling requires an understanding of motion and form as well as a grasp of how the animators need to be able to manipulate a model to bring it to life
- props	Often a subset of environment artist, some times outsource, often the entry-level position for artists...props are the little things that we take for granted in real life but need hundreds of to make a space look convincing
- Lighting	Highly specialized artist who focuses on how light creates volume and mood...a very strange mix of technical and artistic sensitivity is required in this position
- Animation	Makes things move with feeling and nuance
- UI	Creates the art that the player interacts with on screen
- Cinematics / Motion Graphics	The team members that make up a cinematics team may consist of animators, modelers, and 2D artists...but it is its own sub specialty
- Effects	Makes the special effects that go in the game: fire, explosions, snow, rain, lightning, etc.
- Technical Art	Handles the more technical aspects of art creation. Depending on the game engine, there might be a technical artist to support the effects artist, or the lighting artist, or the animation team, or the environment team, or the character team...etc.
-Scripting/Tools (especially MEL)	Writes tools to help artists with their day-to-day tasks...automating any task that is automatable.
-Character Rigging/Weighting	A very specific skill that takes time and attention to detail. The Rigger/Weighter is like an animator but they focus on making it so the animator can actually create the motions and animation suites. This way the "animator" can focus on being creative and the technical artist is there for support and efficiency.
- Outsourcing	Depending on the size of the team, the outsourcing artist (typically referred to as a Outsourcing Manager) is a hybrid producer/artist who may control a budget as well as a team of internal artists who are responsible for integrating outsourced content.

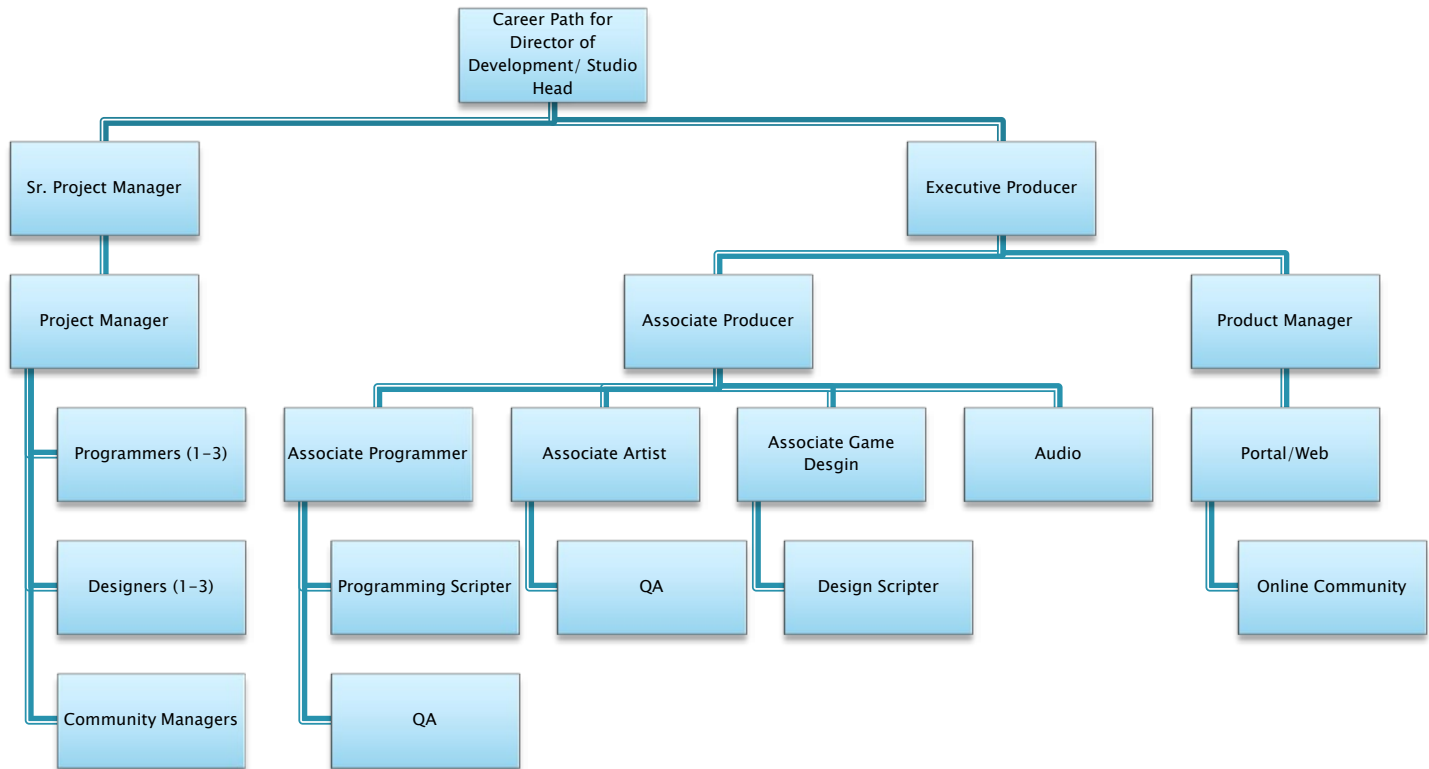
# Organization Chart (100+ employees)



# Organization Chart (~50 employees)



# Studio Head Career Path



## Skills in High Demand

- ▶ Programmers familiar with current tools and connectivity between platforms and social networks
- ▶ Hard coding
- ▶ “Wiring jobs” – ability to stitch code together
- ▶ User Experience
- ▶ UI Artists who are good in flash
- ▶ Game Designers
- ▶ Artists with technical skills & strong communication skills
- ▶ Advanced Graphic techniques – Lighting, AI, Physics
- ▶ FX Artists with real design and communication skills
- ▶ Software Design Engineers in a test environment
- ▶ Quality Assurance Engineers who want to stay on the QA track
- ▶ Project Management Skills – working with different backgrounds (scrum or agile project management)
- ▶ Communication and coordination within team environment
- ▶ Working with High and fast turnaround times
- ▶ Project Studies

### Goal #3:

- ▶ Develop and plan to meet the long-term workforce needs of the cluster

### Education Overview for Industry:

- ▶ Each educational institution presents to industry panel
- ▶ 10 minute presentations, 5 minute Q&A
- ▶ HR Discussion Afterward
- ▶ What skills still needed to be met by education
- ▶ Suggestions from industry on future programs

### Education Meeting Industry Needs?

- ▶ Many programs focused on the creative side of IM production
- ▶ No programs found that focused on engineering outside of DigiPen Institute of Technology and University of Washington
- ▶ Strong need for foundational software engineering knowledge (Hardware, operating systems, data structures, algorithm analysis)
- ▶ No programs identified for in-demand skills such as project management, entrepreneurial and marketing business skills
- ▶ Industry needs online courses for existing employees that focus on the latest industry tools and in business management
- ▶ Repair and/or fortification of our local educational institutions is absolutely necessary

### Moving Forward: Plan of Action

- ▶ Regional job board and portal of communication for industry and education
- ▶ Current contact list for education and industry available on website.
- ▶ Internship plan to be developed between schools and local companies.
- ▶ Create an **Education Alliance** that would involve all schools: community colleges, 4-year programs, technical colleges, state, and private institutions.
- ▶ Sharing curriculum content so schools can cross-reference.
- ▶ Local schools representation at industry conferences.

### Goal #4:

- ▶ Expand the marketing and communication strategies regarding the importance of the cluster to the regional economy

### Is our region Competitive?

- ▶ Who are the top regions in the industry?
- ▶ Who is the most competitive in terms of doing business?
- ▶ What criteria is needed to compare regions?
- ▶ Creation of marketing tool .



# Interactive Media Competitiveness Study

**January 2010**

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## Seattle Region Competitiveness

- ▶ Top tier of the world's leading regions in Interactive Media: Seattle, San Francisco, and San Jose.
- ▶ Seattle region among the most competitive for growth in the IM sector.
- ▶ Findings are based on industry-selected indicators of competitiveness: talent pool, size and diversity of existing industry, education, and costs of doing business.
- ▶ Cost of living and doing business in California draws the Seattle region to the forefront making it the most attractive.
- ▶ Seattle is known for having a highly developed and diverse video game industry.

## Conclusions

- ▶ Response has been very positive and supportive
- ▶ Industry is growing rapidly and is a valuable part of our local economy
- ▶ Workforce is the number one issue for companies
- ▶ Not enough qualified employees in Washington State, let alone the United States to fill the positions available
- ▶ There is a missing link to education
- ▶ To remain competitive, we need to create an educational environment to help foster the future workforce for this industry
- ▶ Actionable steps to continue to move forward with these efforts need to be taken by education and government

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## HIGH TECHNOLOGY DEVELOPMENT CORPORATION

HTDC provides key resources to help develop and retain high technology organizations in Hawaii. Services include business and technology workshops, business plan reviews by trained management consultants, and access to online technology and business resources. The core initiatives are:

- To develop and manage a statewide network of incubation services and facilities that provide new technology businesses with access to business development services, strategic partnerships, networking and marketing opportunities, shared support services, and business mentoring.
- To expand existing business development services for start-ups and existing businesses in the technology sector. Services include nationally-acclaimed programs such as FastTrac Entrepreneurship Training and the Manufacturing Extension Partnership Program.
- To secure and administer federal and private grants and contracts in support of technology research, and to provide technical assistance to small technology businesses so they can successfully compete for these funds and contracts.
- To support skilled workforce development for the technology sector through outreach programs, partnerships, and web-based communications activities.

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## WORKFORCE DEVELOPMENT COUNCIL

The WDC is a private-sector led public agency attached to the Department of Labor and Industrial Relations, responsible for advising the Governor and Legislature on preparing Hawaii's workforce development infrastructure to support economic development and employment opportunities for all. The WDC is also the Statewide Workforce Investment Board for purposes of the federal Workforce Investment Act of 1998. The WDC assists the Governor and Legislature in developing and updating comprehensive five-year strategic workforce investment plans and oversees workforce investment activities in the state.

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